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جامعة الملك عبدالله للعلوم والتقنية
ثول، المملكة العربية السعودية
King Abdullah University of Science and Technology
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The Beacon المنارة

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In brief

The Office of the Arts and the Office of Enrichment Programs hosted two special performances of William Shakespeare's "**Hamlet**" on **Saturday, January 9**.
The performances were put on by **Shakespeare's Globe.** The internationally known troupe is on a two-year tour of the world called "Globe to Globe," with the aim of bringing "Hamlet" to every country in the world.

The **2016 Winter Enrichment Program** (WEP) ran from **January 9 to 22** and included a range of keynote lectures on topics ranging from science in Hollywood films to polar exploration to the future of the energy industry. This year's WEP celebrated the themes of climate change and sustainability.

The Museum of Science and Technology in Islam (MOSTI) hosted a **calligraphy exhibit by Dr. Nader Yehia Azab** from **January 19 to 22**. Dr. Azab's artwork reflects on personal and group emotions articulated through interpretations of verses from Qur'an Karim and Arabic calligraphy.

The Computational Bioscience Research Center (CBRC) held its conference **"Computational and Experimental Interfaces of Big Data and Biotechnology"** from **January 25 to 27.** Conference attendees tackled challenges arising from the size and complexity of data sets and were led by conference co-chairs **Vladimir Bajic**, CBRC director, and **Takashi Gojobori**, CBRC associate director. Keynote speakers included Professor Anna Tramontano of the University of Rome, Professor Jens Nielsen of Chalmers University of Technology, Professor Zhang Zhang of the Chinese Academy of Sciences, Professor Limsoon Wong of the National University of Singapore and Professor Andrey Rzhetsky of the University of Chicago.

All members of the KAUST research community and external industry partners and Saudi universities are invited to attend the KCC symposium entitled **"Catalysis for Artificial Photosynthesis"** from **February 1 to 3**. For more information and to register, visit www.kaust.edu.sa/events/kcc-2016.

On **February 24 and 25**, KAUST will welcome representatives from the University's industrial and scientific partners to the campus for the seventh annual **KAUST Industry Advisory Board** (KIAB) meeting.

KAUST community members are invited to submit original works of art for display in the University Library as part of the **Artists of KAUST 2016 Exhibit**. The exhibition will open with a reception on **Wednesday, April 20** and will run until **Tuesday, May 3**. Creators of paintings, photography, textiles, jewelry, sculpture and ceramics are all welcome to apply. The event is sponsored by the Office of the Arts in collaboration with the University Library.

Faculty and research scientists are invited to participate in the **2016 Saudi Research Science Institute (SRSI)**, a summer research internship program for academically talented high school students. SRSI 2016 will run from **July 16 to August 27**. Prospective mentors must offer suitable five-week projects in the science, technology, engineering and math (STEM) fields that give the students a chance to experience research at KAUST. For more information, contact srsi@kaust.edu.sa.●

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Accolades

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KAUST doctoral student receives **ALESCO award**

KAUST doctoral student Nuha Alhebshi was recently honored as runner-up for a prestigious award from the Arab League Educational, Cultural and Scientific Organization (ALESCO). The 2015 ALESCO Award of Creativity and Technical Innovation for Young Researchers of the Arab Homeland was presented on December 10 to 12, 2015. in Beirut, Lebanon during the Arab Forum for Scientific Research and Sustainable Development, held from December 10-12, 2015. As part of the award, Alhebshi received a certificate, a medal and a check for $6,000.

The focus of the competition was nanotechnology and new materials. Alhebshi's research centered on the conformal coating of Ni(OH)2 nanoflakes chemically deposited on carbon fibers for supercapacitors. Her work was published in the Journal of Materials Chemistry A in 2013.

Alhebshi first carried out research at KAUST in the summer of 2010, when she took part in a summer internship with Associate Professor of Electrical Engineering Khaled Salama. After receiving her bachelor's degree in physics in 2011 from King Abdulaziz University, Alhebshi returned to KAUST to pursue a master's degree in material science and engineering, graduating in 2012. She continued on at KAUST to complete her Ph.D. in 2015 under the supervision of Professor of Material Science and Engineering Husam Alshareef. ●

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1. KAUST doctoral student Nuha Alhebshi displays the medal she received as the runner-up in the 2015 ALESCO Award of Creativity and Technical Innovation for Young Researchers of the Arab Homeland. Courtesy photo

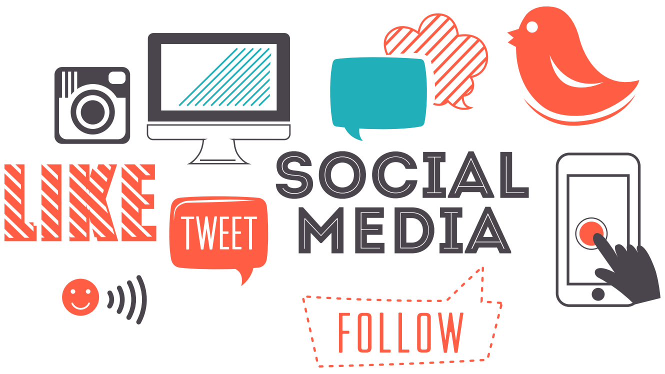
NASA names asteroid after **SRSI alumnus**

KAUST Saudi Research Science Institute (SRSI) alumnus Abduljabbar Al-Hamood, winner of the 2015 Intel International Science and Engineering Fair (ISEF) global science competition for pre-university students, had an asteroid recently named after him by the United States National Aeronautics and Space Administration (NASA).

The main belt asteroid "31926 Alhamood" was discovered more than a decade ago on April 5, 2000 by the Lincoln Laboratory Near-Earth Asteroid Research Team from a research facility in Socorro, New Mexico, U.S.

Al-Hamood was recognized by NASA for several reasons, including his "best of category award and first place in the 2015 Intel ISEF for his plant sciences project. He also received the Dudley R. Herschbach [Stockholm International Youth Science Seminar] SIYSS Award" at the 2015 ISEF, NASA noted.

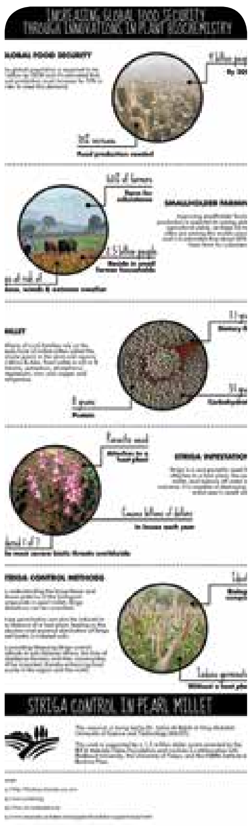
During his time in the KAUST SRSI program, Al-Hamood was mentored by Magdy M. Mahfouz, assistant professor of bioscience. He is currently pursuing a bachelor's degree at Boston University in Boston, Massachusetts. ●



Here's a roundup of **Striga-related content** you shouldn't miss

In December 2015, KAUST received word that the Gates Foundation would support Associate Professor Salim Al Babili's Striga (witchweed) research. **http://goo.gl/GtNgF5**

Understanding the fight against striga can be difficult, so we put together this infographic to make it clearer. **http://www.kaust.edu.sa/assets/downloads/strigaInfograph-icfeb2016.pdf**


INCREASING GLOBAL FOOD SECURITY THROUGH INNOVATIONS IN PLANT BIOCHEMISTRY
STRIGA CONTROL IN PEARL MILLET

KAUST Associate Professor of Plant Science Salim Al Babili talks about his work in this beautiful video. **buff.ly/1NHt5pc**

Hassan Al Damluji, the head of Middle East relations at the Bill and Melinda Gates Foundation, published a short story in Newsweek that puts the KAUST contribution in a global perspective. **http://newsweekme.com/seeds-of-growth/**

African farming and food processing knows that fighting witchweed is no joke. **http://goo.gl/QJMeL3**

Successful women in science and engineering

By Caitlin Clark

“If you want to be a scientist, it's not an easy job—it's a hard job, and it's not easy for men or women. There are many things you have to be dedicated to,” said KAUST Professor of Environmental Science and Engineering Suzana Nunes at the University's 2016 Winter Enrichment Program (WEP) seminar entitled “Women in Science and Engineering.”

The seminar brought together six women scientists at different stages in their careers from around the world to speak about the challenges they overcame to succeed in their fields. The scientists also answered questions from audience members covering a variety of areas important to women working in science, such as balancing work life with childcare and having a family.

Different paths—fascinating careers

Panelists Jasmeen Merzaban, KAUST assistant professor of bioscience; Dr. Brinda Sarathy, associate professor of environmental analysis at Pitzer College (U.S.); Dr. Joanna Haigh, professor at Imperial College London (U.K.); Nunes; KAUST postdoctoral fellow Sandra Schmoeckel; and KAUST Professor of Bioscience Charlotte Hauser stressed that although their journeys in science led them on winding paths, they would not trade their experiences for any other career.

The scientists also noted that in Saudi Arabia, women make up 60% of higher education graduates and will play key roles in the development of the Kingdom's new knowledge economy, particularly in the fields of science and engineering. They emphasized how there are myriad opportunities to expand the involvement of women in these fields, and targeted their comments at young women about to enter the workforce.

Balancing work and life in the sciences

Merzaban, who in 2014 was awarded a L'Oréal-UNESCO “For Women in Science” fellowship in Dubai, said, “I think it's important to single out women and show they can become good scientists. It's also important to show we can have families and manage all the things life offers and still make important scientific contributions.”

“I made no formal career plans,” said Haigh, who is also co-director of Imperial College's Grantham Institute for Climate Change & Environment. “You must see where the road takes you, and things just usually happen, but it's important to remember to take opportunities as they come.”

Hauser, who came to KAUST in 2015 from a background marked by successes in academia and industry in Europe and Asia, noted, “It is important you try to go for your dreams, even if there are hurdles. Don't become afraid—you may encounter challenges, but you will be very proud when you overcome them.

“You must always find the next step further in your career and life journey,” she continued. “Make your own story as a woman in science—that is the most important thing. Don't be shy and go for it with your ideas!”●

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سيدات ناجحات
في العلوم والهندسة

أقامت جامعة الملك عبدالله للعلوم والتقنية ندوة بعنوان (المرأة في العلوم والهندسة) وذلك ضمن فعاليات برنامج الإثراء الشتوي (ويب) لعام 2016. وضمت الندوة ست عالمات من جميع أنحاء العالم في مراحل مختلفة من حياتهن الوظيفية وهن: الدكتورة ياسمين مرزبان، أستاذ مساعد في العلوم البيولوجية في جامعة الملك عبدالله، والدكتورة برندا ساراثي، أستاذ مساعد في التحليل البيئي في كلية بيتزير (الولايات المتحدة)، والدكتورة جوانا هايغ، أستاذة في كلية إمبريال في لندن (المملكة المتحدة) ومديرة مشاركة لمعهد غرانثام للتغيرات المناخية والبيئة، وساندرا شموكيل، زميلة ما بعد الدكتوراه في جامعة الملك عبدالله، والدكتورة شارلوت هاوزر، أستاذة العلوم البيولوجية في جامعة الملك عبدالله. وخلال الندوة تمت مناقشة التحديات والمصاعب التي واجهت ضيفات الندوة وكيف استطعن التغلب عليها والنجاح في مجالاتهن العلمية. كما أتيحت الفرصة لأسئلة الحضور والتي غطت مجموعة متنوعة من المجالات الهامة للمرأة العاملة في مجال العلوم، مثل تحقيق التوازن بين الحياة العملية ورعاية الأسرة وتربية الأطفال.

مسارات مختلفة ووظائف رائعة

تحدثت أستاذة العلوم والهندسة البيئية البروفيسورة سوزانا نونيس عن المقومات اللازمة التي يحتاجها الفرد ليصبح عالماً فقالت: ”إذا أردت أن تصبح عالماً، فاعلم أنه ليس بالأمر الهين. إنها مهمة شاقة للغاية سواءً للرجال أو النساء، وتتطلب قدراً كبيراً من التصميم والتفاني“.

كما أشرن العالمات في الندوة إلى أن النساء يشكلن 60٪ من خريجي التعليم العالي في المملكة العربية السعودية، وهذا يجعل دورهن أساسي وفاعل جداً في تطوير الاقتصاد المعرفي للمملكة، وخاصة في مجالات العلوم والهندسة. وأكدن أيضاً أن هناك فرصاً لا تعد ولا تحصى لتوسيع مشاركة المرأة السعودية في هذه المجالات، خصوصاً الشابات اللاتي على وشك دخول سوق العمل.

التوازن بين العمل والحياة

تقول الدكتورة ياسمين مرزبان ، الحاصلة على جائزة لوريال-اليونسكو 2015 للنساء الرائدات في مجال العلوم : ”من المهم إبراز الدور الكبير للمرأة في مجال العلوم. ومن المهم أيضا إدراك أن المرأة بإمكانها تكوين أسرة وإدارة جميع أمور حياتها وفي نفس الوقت تحقيق إنجازات علمية رائدة“.

وتقول الدكتورة هايغ: ”لم تكن لدي أي خطط رسمية نحو حياتي المهنية. لأني أعتقد أنه ينبغي على المرأة أن تتحلى بالعزيمة وترى أين سيأخذها الطريق. وخلال ذلك ستحدث أمور وتتوفر الفرص عندها يجب استغلال هذه الفرص على الوجه الأكمل“.

أما الدكتورة شارلوت هاوزر، التي انضمت إلى جامعة الملك عبدالله في عام 2015 وتحمل خبرات ونجاحات كبيرة في الأوساط الأكاديمية والصناعية في أوروبا وآسيا، فتقول: ”من المهم أن تسعى المرأة لتحقيق طموحاتها وأحلامها مهما كانت العقبات. لا ترددي في خوض التحديات، لأنك ستكونين فخورة جداً عندما تتغلبين عليها. ويجب أن تواصلي التقدم في حياتك المهنية وحياتك العامة. وأهم شيء أن تكتبي قصة نجاحك الرائعة كامرأة مؤثرة في مجال العلوم“. ●

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1. (From L-R) KAUST professors Suzana Nunes, Charlotte Hauser and Jasmeen Merzaban are examples of successful and inspiring female scientists.

2. Successful women scientists from KAUST and around the world participate in the University's 2016 WEP seminar entitled "Women in Science and Engineering." By Caitlin Clark

2016 Science Fair a 'big bang'

By Diane Burgoyne

The 2016 Winter Enrichment Program (WEP) Science Fair was held on January 19 as children from The KAUST School (TKS) and 80 guests from the Thuwal and Qadimah schools were mesmerized by Dr. Chris Smith's science show "Blow Your Mind."

With the aid of KAUST doctoral student Mariam Awlia, who acted as translator, and postdoctoral fellow Sandra Schmoeckel, who acted as lab assistant, Smith created colored lights by heating various elements, shot small missiles through a tube with the help of a vacuum cleaner and floated balloons and toilet paper to demonstrate different scientific principles. The big finale featured exploding hydrogen-filled balloons that illustrated the effect of heat on confined molecules. Bang! The children loved it!

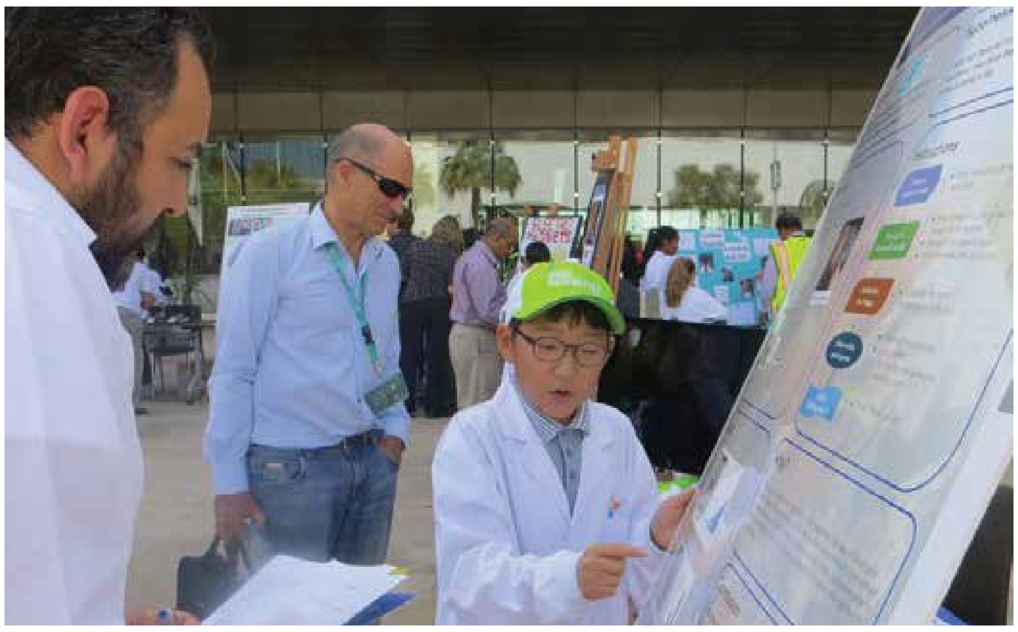
The audience, KAUST graduate students, faculty and community members then visited the annual WEP Science Fair on the Discovery Walk. The fair featured exhibits, demonstrations, KAUST research experiments and TKS projects.

An experiment that drew a large crowd was a sustainable greenhouse food production model. It showcased hydroponics, aquaponics and cooling/water recovery. Another was "Plants and Salt Stress," where experts showed visitors plants growing under salt stress conditions and explained how they are working to make plants more salt tolerant.

John Kim, a TKS grade 5 student, showed off his research into "How big is the importance of washing hands and what is the difference in the number of germs on your hands under different conditions?" Fellow TKS students Leah Bakken, Vidya Mande, Natasha Ford and Abbie Ross measured CO2 levels around the KAUST community using CO2 Pastco data loggers.

Another big crowd draw was an experiment designed to test taste preferences between tap water and bottled water. There was also a display of the large number of plastic bottles used in the University Diner in one month, which worked to encourage visitors to take steps to protect the environment. ●

Members of the KAUST community of all ages enjoy the ingenuity and experiments on display at the University's 2016 WEP Science Fair.



PROGRAM
OPENING NIGHT
LEADERSHIP AND INNOVATION
IN ENVIRONMENTAL SUSTAINA
THE FUTURE OF SAUDI ARABI
A KEYNOTE LECTURE BY
HE ENG. ABDULLATIF A. AL-OTH
GOVERNOR, SAGIA
FOLLOWED BY A SAUDI ART EXHIBITION
AND COCKTAIL RECEPTION
WINTER
ENRICHMENT

A keynote to remember from H.E. Abdullatif Al-Othman

By Nicholas Demille

It was to a packed auditorium that His Excellency Abdullatif Al-Othman, governor and chairman of the board of directors of the Saudi Arabian General Investment Authority (SAGIA), spoke on January 10, 2016. His talk entitled "Leadership and Innovation in Environmental Sustainability: The Future of Saudi Arabia" detailed the ambitious plans the Kingdom has to weather current and future challenges.

Al-Othman's speech was the opening keynote lecture to the University's 2016 Winter Enrichment Program (WEP). He was introduced by KAUST Professor of Plant Science Mark Tester, who opened the night's proceedings, and the University's President Jean-Lou Chameau. The lecture was an excellent introduction to the two-week schedule of WEP activities centered around the year's theme—sustainability.

Investing in the Kingdom

Al-Othman spoke about the Kingdom's new, ambitious plans to move towards a knowledge economy and invest heavily in alternative forms of energy production. He noted that "the Kingdom has identified over 19 billion in sustainable energy projects," something he said would create jobs and diversify the economy.

Calling on his fellow Saudis to roll up their sleeves and contribute meaningfully to moving the country forward, Al-Othman said, "Those who can do more, must do more. Those with a greater ability to create a brighter future for our children must do so."

Al-Othman is in the ideal position to understand how this investment can help improve the Kingdom's economy. Appointed governor of SAGIA in 2012, he also spent more than three decades at Saudi Aramco in various leadership and executive positions.

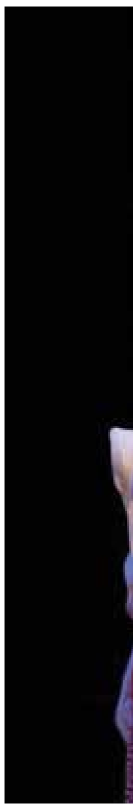
A charge for success

"I have very fond memories of KAUST, as it is the embodiment of our late King Abdullah's vision 'to create an enduring model for advanced education and scientific research,'" Al-Othman said. "While the leadership of the King has set us on the right path, it is up to each of us to be stewards of his vision."

He plainly laid out the path to success for KAUST. "Saudi Arabia believes in [the University's] potential," he said. "Ultimately, however, it is up to you as an institution to ask yourself, 'Are we really enriching the Kingdom and the world?' This is your scorecard and I look forward to working with you to achieve it."

Al-Othman also spoke of his affection for the University—not only because of his close relationship with President Chameau, but also because of the immense pride Saudis in general feel about their one-of-a-kind creation.

"It's a point of pride for Saudis to see KAUST grow and succeed," he said.●



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1. His Excellency Abdullatif Al-Othman delivers the 2016 WEP opening night keynote address on Sunday, January 10 at KAUST. By Nicholas Demille

2. Governor of the Saudi Arabian General Investment Authority Abdullatif Al-Othman speaks to a packed house in the University Auditorium on January 10. By Nicholas Demille

كلمة معالي المهندس عبداللطيف العثمان في افتتاح فعاليات برنامج الإثراء الشتوي

ألقى معالي المهندس عبداللطيف بن أحمد العثمان، محافظ ورئيس مجلس إدارة الهيئة العامة للاستثمار (SAGIA)، كلمة افتتاحية بمناسبة بدء فعاليات برنامج الإثراء الشتوي (ويب) لعام 2016 في جامعة الملك عبدالله للعلوم والتقنية. وتناولت كلمة معالي المحافظ التي كانت بعنوان "القيادة والابتكار في الاستدامة البيئية: مستقبل المملكة العربية السعودية"، تناولت تفاصيل الخطط الطموحة التي وضعتها المملكة لمواجهة التحديات الحالية والمستقبلية، وتمثل بداية ممتازة لبرنامج الاثراء الشتوي لهذا العام والذي تمحور موضوعه حول الاستدامة.

الاستثمار في المملكة

وتحدث معالي المحافظ عن الخطط الطموحة والجديدة التي تدعم توجه المملكة نحو الاقتصاد المعرفي والاستثمار بكثافة في مصادر الطاقة البديلة. وأشار إلى أن المملكة قد حددت مليارات الريالات لمشاريع الطاقة المستدامة، والتي من شأنها توفير فرص عمل جديدة، وتنويع الاقتصاد.

كما دعا معالي المهندس عبداللطيف زملاءه من المستثمرين وأصحاب رؤوس الأموال السعوديين، وناشدهم ليشمروا عن سواعدهم وأن يساهموا بفاعلية في دفع البلاد إلى الأمام، وأن يبذلوا كل ما في وسعهم لبناء مستقبل أكثر إشراقا لأطفال المملكة.

وخلال كلمته، تحدث معالي المهندس عبداللطيف عن جامعة الملك عبدالله وقال: "أملك ذكريات جميلة جداً عن جامعة الملك عبدالله، هذا الصرح الكبير الذي يعتبر تجسيداً للرؤية الكريمة والطموحة للملك عبدالله بن عبدالعزيز- يرحمه الله- في إنشاء نموذج دائم للتعليم العالي والبحث العلمي."

كما أشاد معالي المهندس عبداللطيف بالجامعة مبيناً أن المملكة العربية السعودية تؤمن بقدرات وإمكانات الجامعة، وقال العثمان مخاطباً الحضور ومسؤولي الجامعة: "أنتم كمؤسسة علمية، تقع على عاتقكم الأن مسؤولية إثراء المملكة والعالم. فهذه هي رسالتكم وأنا أتطلع للعمل معكم لتحقيق ذلك".

وختم معالي المهندس كلمته موضحاً مدى حبه لجامعة الملك عبدالله وعلاقته الوثيقة مع رئيسها الدكتور جان-لو شامو، وأخبر أن السعوديين يشعرون بعميق الفخر لهذا الإنجاز الكبير والصرح المتميز، حيث قال: "تطور ونجاح جامعة الملك عبدالله كان ولا يزال مصدر فخر واعتزاز لكل السعوديين".●

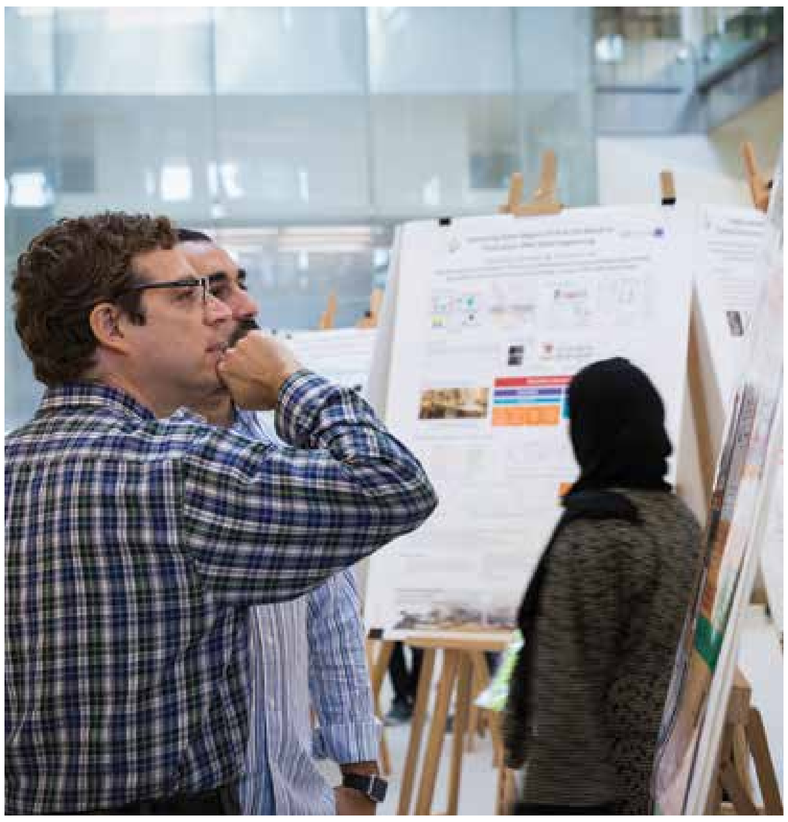
KAUST celebrates the **Year of Light**

The KAUST International Year of Light (IYL) Open Day, hosted by the University to honor 2015 as the UNESCO year dedicated to light, took place on December 3, 2015. The event celebrated the impact light has on human welfare and highlighted the importance of light research as one of the most challenging fields in contemporary science.

The open day exhibition featured researchers from the University's Computer, Electrical and Mathematical Science and Engineering Division (CEMSE) and the Physical Science and Engineering Division (PSE) showcasing the latest technological developments in light research, with special emphasis on photonics and LED-based technologies and on the innovative applications they will bring to the energy and communication sectors in the future. Exhibits and demonstrations were directed by KAUST Professor of Electrical Engineering Boon Ooi.

The IYL Open Day was designed to promote a deeper understanding of the latest achievements in light research, taking the public on a journey across the history of light from the first studies of optics 1,000 years ago to the latest discoveries in optical communications, medicine, agriculture and the energy sector. ●

KAUST held an Open Day event to celebrate 2015 as the UNESCO International Year of Light on December 3, 2015.



Kip Thorne and **the science of 'Interstellar'**

By David Murphy

The second week of the University's 2016 Winter Enrichment Program (WEP) program began with a look to the stars and to Hollywood, as world-renowned astrophysicist and theoretical physicist Kip Thorne spoke about his role as the lead scientific advisor for the 2014 Hollywood blockbuster "Interstellar" during a highly anticipated keynote address on January 17.

In 2006, Thorne and movie producer Lynda Obst conceived the underlying concepts for a science fiction movie that ultimately became "Interstellar." The movie, which stars Matthew McConaughey and Anne Hathaway, deals with an uncertain fate for mankind, as humans must leave their dying home on Earth in search of other possibly habitable planets beyond our galaxy.

Thorne worked closely with Obst and writers Johnathan and Christopher Nolan to ensure that hard science was the backbone of the Nolan brothers' vision for the movie. He also teamed with the movie's visual effects team to ensure that black holes, wormholes and other astrophysical objects depicted were scientifically sound and plausible to his peers and the greater scientific community.

Between hard science and fiction

Throughout the talk, Thorne described his experience as man of science collaborating with filmmakers, artists, actors and composers as a role that sits at the crossroads between science and the arts. He detailed his theories and scientific findings as they were discussed, dissected and added to the framework that eventually became "Interstellar."

Thorne noted how, at his first meeting with Christopher Nolan, who also directed the movie, Nolan stated, "I want a movie that ends as puzzlingly as Stanley Kubrick's '2001: A Space Odyssey,' but I want an ending that can be explained, and that's where you [Thorne] come in."

Nolan and Thorne's collaboration did not always go

smoothly, however. Thorne spoke freely about frank discussions and disagreements between the two as Nolan attempted to wrap his burgeoning vision around Thorne's unwavering adherence to science.

A wide-ranging scope of deep science

"Interstellar" featured a large scope of deep science, including topics such as the design of Gargantua, the movie's main black hole. Thorne discussed wormholes, tesseracts and gravitational waves, showing how his theories played a part in the movie's final cut by playing clips of "Interstellar" to the audience.

"You can tell all of your friends and family that tonight at KAUST, you've been through wormholes, black holes and tesseracts," KAUST President Jean-Lou Chameau stated at the close of the lecture. "I hope you appreciate the love that [Thorne] has for science and the passion he has for communicating science."●

World-renowned astrophysicist and theoretical physicist Kip Thorne speaks during WEP 2016 about his role as the lead scientific advisor for the 2014 Hollywood blockbuster "Interstellar."

Advances in **uncertainty quantification methods**

KAUST hosted the Advances in Uncertainty Quantification Methods, Algorithms and Applications conference (UQAW2016) from January 5 to 10, 2016. The conference was organized by the University's SRI Center for Uncertainty Quantification in Computational Science and Engineering, directed by Professor of Applied Mathematics and Computational Science Raul Tempone.

2016 marks the fourth consecutive year KAUST held the UQAW annual event, which is dedicated to reporting on state-of-the-art and latest advances in the methods used to quantify calculation uncertainties. The aim of the discussion forum is to exchange information on innovative algorithm design and practical applications and their performance in experimental settings.

The conference is an excellent opportunity for experts to meet and collaborate and for students starting their careers in science to get involved in top-notch research and network with prominent international researchers in statistics.

This year, 75 oral and poster presentations were featured at the event, and the conference hosted 20 invited speakers from countries including the United States, Germany, Canada, France, Greece and the U.K.

Professor Tempone also presented his latest research on computational approaches to fouling accumulation and wear degradation based on stochastic differential equations.●

KAUST faculty, students and international speakers take part in the University's Advances in Uncertainty Quantification Methods, Algorithms and Applications conference (UQAW2016) from January 5 to 10 on campus.

Fighting fouling at play

In simple terms, industrial processes with fouled pipes consume more energy. From a business standpoint, the motivation to predict and eventually mitigate fouling accumulation is quite clear. Current maintenance operations are based on the assumption that the fouling accumulation is deterministic over time and space, when, in reality, fouling deposition takes place randomly, making the resulting anti-accretion measures less cost-effective.

Fouling deposition is a pervasive process that affects all real pipework and induces a progressive loss of the system's operative efficiency. Overlapping layers of fouling in heat exchangers and in cooling water systems of oil refineries, for example, are responsible for the increased resistance to heat transfer and for the consequent reduction of performance of the energy generation system. With this in mind, a reliable model of fouling accumulation has been clearly necessary to optimize maintenance operations and reduce engine shut-down periods.

Devising an effective model

Professor of Applied Mathematics and Computational Science Raul Tempone and his team at the Uncertainty Quantification in Computational Science and Engineering Center at KAUST took on this problem. They devised an innovative computational approach based on stochastic differential equations to predict the fouling patterns of heat exchangers.

The group developed a stochastic model that dramatically improves maintenance costs as well as time management. The probability distribution developed by Tempone's group realistically described the accumulation of the twin-track source of fouling—organic and inorganic—and produced a model of the phenomenon dynamics able to realistically describe fouling accumulation.

Putting the model to work

A practical related application that challenged Tempone's group was whether their stochastic model would help in predicting wear-degradation levels of cylinder liners in cargo ships. Today, preventive maintenance of large vessels is carried out mainly to avoid insurance claim rejections in case of mechanical failures.

With cylinder liners aging, the frequency of controls progressively increases, decreasing the ratio of the insurance cost over costs of ship maintenance. In a manner similar to fouling accumulation, cylinder liner degradation is a random process that needs stochastic modeling. Tempone and his collaborators were able to produce a probabilistic description of the evolution of the wearing and identified cost-effective maintenance levels.

Students **build and race robots**

By David Murphy

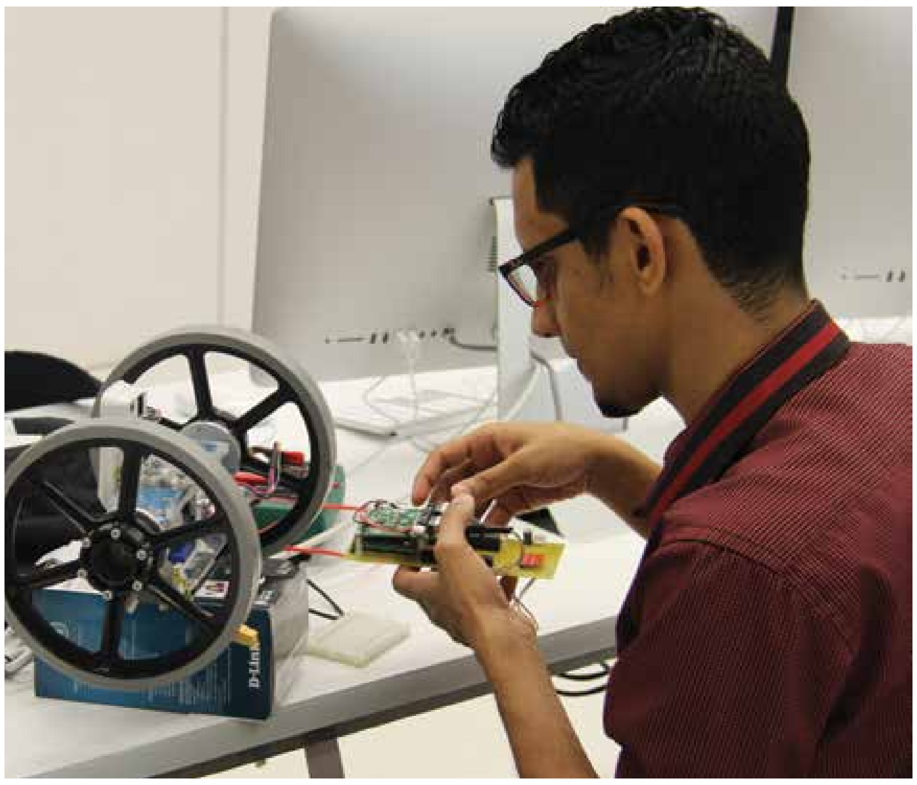
Saudi Aramco's Intelligent Systems Lab is located on the KAUST campus, and its members work on developing robotic systems for the energy sector. The lab held a "Design and Build Your Own Robot" workshop for KAUST students January 10 through 14 as part of the University's 2016 Winter Enrichment Program (WEP).

The project-based workshop was aimed at providing the students with hands-on experience in designing, building and programming robotic systems. The students were divided into seven interdisciplinary teams of three to six people, in which they worked on the design, fabrication and testing of their robotic systems.

"We submitted a proposal for the workshop to the WEP 2016 organizers in 2015 and it was accepted, so we began organizing a fully fledged workshop," said Fadl Abdellatif, one of the workshop's speakers and organizers. Abdellatif, a design engineer in Aramco's Intelligent Systems Lab, is also a KAUST graduate who completed his master's degree in mechanical engineering at the University in 2011.

Creating a fully-functional robot from scratch

"Three parallel areas were covered in constructing the robots," noted Abdellatif. "These include mechanical design, electronics development and embedded programming, all demonstrating the complete design cycle involved in creating a fully functional robot from scratch."



Seven robots developed during the workshop were then showcased in a competitive race during the annual WEP Science Fair event held on the Discovery Walk on January 19.

"The workshop and the robot-racing competition were very well received by the students, the WEP organizers and the community," Abdellatif said. "The students provided positive feedback about the workshop and they had fun while learning something new. We're hoping to teach the students about more interesting topics related to robotic systems during next year's WEP in another workshop. We organizers felt our 2016 workshop's success was yet another example of the skill, passion and engineering aptitude of KAUST students."

KAUST students build and program their own robots during WEP 2016. By David Murphy

Commercializing innovation for industry partners

Support for an innovation ecosystem—one that will help diversify and transform Saudi Arabia's economy on a long-term basis—is an important part of the KAUST mission. The University has set out to help large Saudi organizations contribute to the development of a knowledge-based economy through corporate training programs such as REVelate.

What is REVelate?

REVelate is a three-day corporate innovation program run by the KAUST Innovation Entrepreneurship Center with support from the Industry Engagement Office. The program helps embed entrepreneurial spirit into organizational culture by combining elements of new product and service creation, as well as the incubation of new ideas within an existing organization.

One organization that has benefited from engagement with KAUST Innovation is the Saudi Electricity Company (SEC). Shafi Alhsaien, the head of research projects at SEC, attended REVelate with his colleagues in 2014.

"REVelate helped us to commercialize innovative ideas that were developed by some of our top engineers," said Alhsaien. "It's a great tool for organizations planning to launch or improve a product or service."

The SEC was able to accelerate an idea on testing, inspecting and repairing turbines as part of the 2014 program. Thanks to their REVelate experience, they also signed agreements with Saudi Aramco and King Fahd University of Petroleum and Minerals (KFUPM) for further testing of turbines.

"We learned how to present our value proposition, define our customers and collaborators, sell the potential service and calculate the cost," said Alhsaien."Without REVelate, we would not have had a clear understanding of how best to do this."

Collaboration is key

Another important benefit for the SEC has been membership in the KAUST Industry Collaboration Program (KICP). Partner organizations such as the SEC get access to a wide range of benefits, including pilot testing facilities, advanced education and training programs, a seat on the KAUST Industry Advisory Board (KIAB), access to KAUST students and project cooperation in a number of sectors.

"The SEC and a number of KIAB partners continue to benefit from KAUST's corporate innovation programs such as REVelate," said Mark Crowell, KAUST vice president of Innovation and Economic Development. "Through partnerships with key companies, an innovation ecosystem is growing that will foster a more entrepreneurial culture in Saudi Arabia and the region."

Welcoming partners to campus

KIAB was established to ensure ongoing alignment of the University's academic, research and economic development goals with those of industry. Advisory board members include a number of Saudi and international organizations, with the board focusing on advancing research and development in the Kingdom.

KAUST will host the University's seventh annual KIAB meeting on February 24 to 25, 2016. The SEC's President and CEO Ziyad Bin Mohammed Al-Shiha will be the keynote speaker.●

Mark Crowell, KAUST vice president of Innovation and Economic Development, noted that partnerships with key companies are building an innovation ecosystem in Saudi Arabia.

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KFUPM visits KAUST **to discuss collaboration**

By Diane Burgoyne

Faculty members and leadership from King Fahd University of Petroleum & Minerals (KFUPM) visited KAUST on November 25 and 26, 2015 to discuss collaboration between the two universities.

The group was welcomed by the Director of the KAUST Core Laboratories Dr. Justin Mynar and taken on a tour of the Visualization Lab, the University's supercomputer, the Nanofabrication and Thin Film Core Labs and the Clean Combustion and Water Desalination Research Centers.

Jean Fréchet, KAUST vice president for research, opened the plenary session by saying that it was time to increase collaboration with in-Kingdom universities, of which KFUPM is a leading example.

"We are two very good universities with very good faculties. What can we do together? We need to look for common ground and then take action. The onus to begin collaboration is on everyone present here today," said Fréchet.

Information about programs at the two institutions in which collaboration might take place was provided in talks by KFUPM Professor of Electrical Engineering Ibrahim M. El-Amin; KAUST Professor of Electrical Engineering Jeff Shamma; KFUPM Professor of Chemical Engineering and Coordinator of the Center for Modeling and Computer Simulation Abdullah Shaikh; and KAUST Professor of Applied Mathematics and Computational Science and Director of the Extreme Computing Research Center David Keyes. The talks were followed by question and answer sessions.

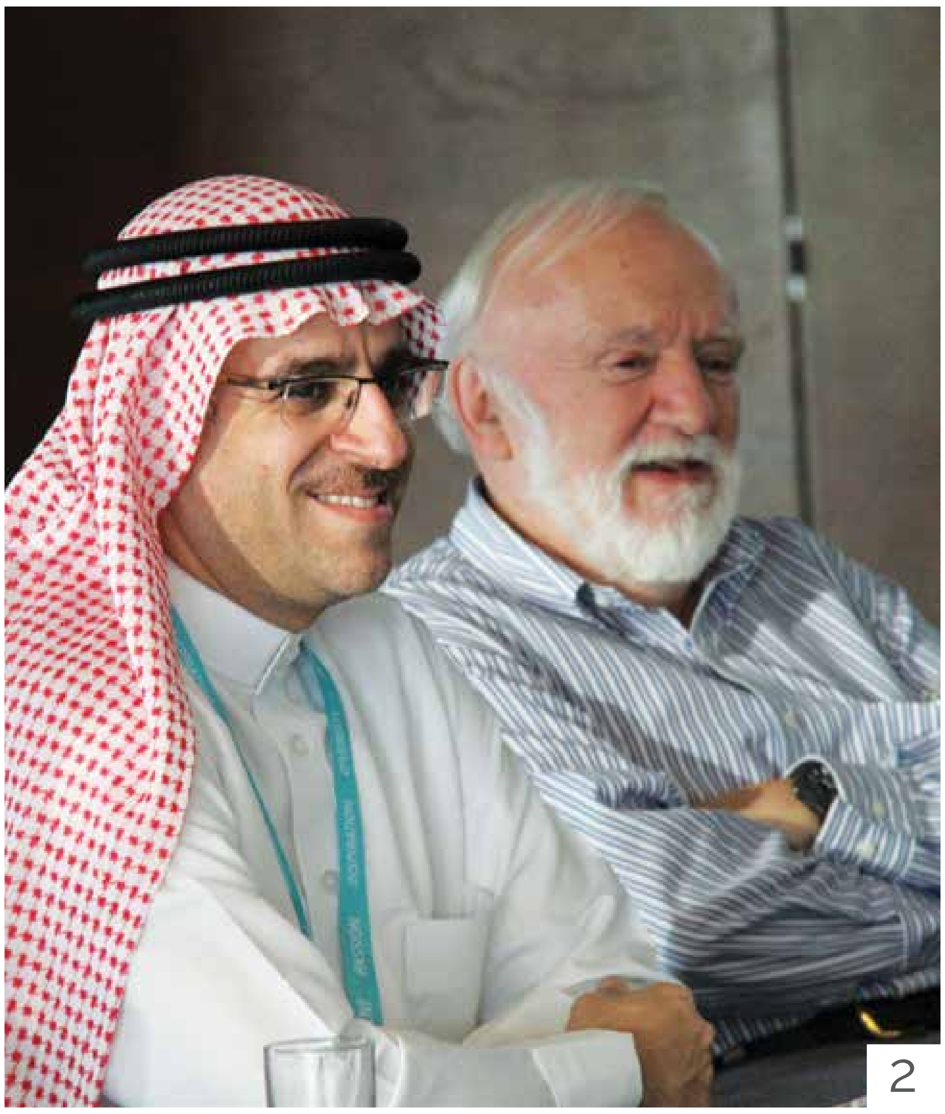
Opportunities for collaboration in electrical engineering and modeling and computer simulation were discussed in breakout sessions and presented to the group in a debrief and discussion session.

"The visit by KFUPM faculty and the meetings to discuss areas of potential collaboration produced convergent ideas in electrical engineering and in modeling and simulations. We look forward to determining the best possible opportunities for action-oriented next steps with neighboring faculty members at KFUPM," said Dr. Moody Altamimi from the KAUST Office of Sponsored Research, who acted as co-organizer of the event with Dr. Wajih Abu-Al-Saud, director of the KFUPM Office of KFUPM-KAUST Cooperation. ●

1. During breakout sessions on the November 25 and 26, 2015 meetings, each group presented highlights of potential opportunities for collaboration.

2. Dr. Wajih A. Abu Al-Saud, director, Office of KFUPM-KAUST Cooperation (L), and Dr. Jean Fréchet, vice president for research at KAUST.

3. KAUST senior leadership and faculty members and leadership from KFUPM on their November 25 and 26 KAUST visit to discuss collaboration between the two universities.



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وفد من جامعة الملك فهد للبترول والمعادن يزور جامعة الملك عبدالله للعلوم والتقنية **لمناقشة أوجه التعاون**

زار أعضاء هيئة التدريس وقيادات جامعة الملك فهد للبترول والمعادن (KFUPM) جامعة الملك عبدالله للعلوم والتقنية (KAUST) يومي 25 و 26 نوفمبر 2015 لمناقشة أوجه التعاون بين الجامعتين.

وقد استقبل الوفد الزائر الدكتور جوستين ماير - مدير المختبرات الرئيسية بجامعة الملك عبدالله للعلوم والتقنية- الذي رافق الوفد في جولة في المختبر المركزي للتصور، ومركز الحوسبة الفائقة "شاهين"، ومختبر تصنيع النانو المتقدم، ومركز تحلية وإعادة استخدام المياه، ومركز أبحاث الاحتراق النظيف.

استهل جان فريشيه- نائب الرئيس للأبحاث- الجلسة الافتتاحية قائلاً: إنه قد حان الوقت لزيادة التعاون بين الجامعات داخل المملكة، والتي تعد جامعة الملك فهد للبترول والمعادن مثالا رائداً لها.

وأضاف جان فريشيه: "نحن جامعتان متميزتان، تضمان مجموعة جيدة من أعضاء هيئة التدريس. فكيف يمكننا العمل معا؟ نحن بحاجة إلى البحث عن أرضية مشتركة للتعاون ثم نتخذ الخطوات اللازمة. والمسؤولية تقع على جميع الحضور هنا اليوم لبدء هذا التعاون.

تم تبادل المعلومات عن البرامج الخاصة بالجامعتين التي يمكن التعاون من خلالها بكلمة ألقاها كل من أستاذ الهندسة الكهربائية بجامعة الملك فهد للبترول والمعادن الدكتور ابراهيم الأمين، وأستاذ الهندسة الكهربائية بجامعة الملك عبد الله للعلوم والتقنية الدكتور جيف شامة، وأستاذ الهندسة الكيمائية ومنسق مركز النمذجة والمحاكاة الحاسوبية بجامعة الملك فهد للبترول الدكتور عبد الله شيخ، وأستاذ الرياضيات التطبيقية والعلوم الحاسوبية ومدير مختبر أبحاث الحوسبة الفائقة بجامعة الملك عبد الله الدكتور ديفيد كييز. وأعقبت هذه المحاضرة جلسة للإجابة على التساؤلات.

وخلال الزيارة، تمت مناقشة فرص التكامل بين الجامعتين في مجال الهندسة الكهربائية والنمذجة والمحاكاة الحاسوبية، وتم عرض نتائج هذه المناقشات على الحضور بإيجاز خلال جلسة المناقشة.

واختتمت الدكتورة موضي التميمي من مكتب الأبحاث المشارك في تنسيق الحدث مع الدكتور وجيه أبو السعود، مدير مكتب التعاون بين جامعتي الملك فهد للبترول والمعادن والملك عبدالله للعلوم والتقنية، مؤكدة أن الزيارة التي قام بها أعضاء هيئة التدريس بجامعة الملك فهد للبترول والمعادن واجتماعاتهم لمناقشة مجالات التعاون المحتملة عن بعض الأفكار المتقاربة في مجال الهندسة الكهربائية والنمذجة والمحاكاة، كانت زيارة مثمرة. ونحن نتطلع إلى تحديد أفضل الفرص الممكنة لاتخاذ الخطوات التالية مع أعضاء هيئة التدريس بجامعة الملك فهد للبترول والمعادن.●

My University

Angela Alfieri

Before moving to KAUST, Angela Alfieri, a project assistant in the University's Red Sea Research Center, had a diverse working background from the U.S., France and her native Italy—but she never had the opportunity to work in her own field, international relations.

"I've been a tutor for Latin and Italian students, a supervisor in a laundry cleaner and a salesgirl in an optical store, and I was responsible for an ice cream laboratory in Italy," she said. "Although I wish I could have worked in my own field, my KAUST job gives me the opportunity to interact with good people from all over the world and be connected to something really related to Saudi Arabia: the Red Sea."

Alfieri came to KAUST with her husband and children, and noted that KAUST is a great place for her children to grow up.

"Everything at KAUST—like recreational activities, the schools and the environment—has been created with families in mind," she said. "I feel safe here and at the same time connected to the rest of the world. I'm also proud to be part of the ambitious 'KAUST project' and the vision of King Abdullah."●

Where do you read The Beacon?

This month's submission comes from Claire Morris, a technical writer and editor in Facilities & Community. In November 2015, Morris visited the U.K.'s Dyrham Park, a historic late 17th-century mansion located eight miles from the city of Bath.

Dyrham Park was built by civil servant William Blathwayt, and features elegant furnished interiors that have changed little over the centuries. Visitors to the house can enjoy its 270 acres of gardens and beautiful parkland, where a herd of freely roaming fallow deer lives throughout the year.

The U.K.'s National Trust organization looks after the upkeep of the house and grounds, and is currently renovating the house due to a leaking roof. Morris's father, a National Trust volunteer who works as a "house guide" for Dyrham Park, took her on a tour of the house in November.

"Dyrham Park has been used as a filming location for many iconic period dramas, television shows and movies, such as 'The Remains of the Day,' 'Australia' and 'Doctor Who,'" Morris explained. "The house and grounds are absolutely stunning. My father is so proud of what he likes to call 'his house'—if only!"●

The Integrated Ocean Processes team from the Red Sea Research Center with members of the Green Office Certification team from the Office of Health, Safety and Environment.
Back row (L to R):
Amr Atiah, Jacqueline Piper, Shahzad Ghauri, Prof. Burt Jones, Susana Carvalho, Jorge Rosas and Jennifer Otoadese
Middle row (L to R):
Muna Kris, Carol Carmichael, Mark Jackson and Angela Alfieri
Front row (L to R):
Mohammad Alshawaf, Sufiyan Khan and Michael Campbell

Certification aims to reduce environmental footprint

The University's Green Office Certification Program (GOCP) began on Earth Day in 2014 and is a voluntary program to reduce office environmental footprints as part of the campus-wide overall drive towards sustainability. So far, 18 University offices have registered to attain certification under Health, Safety and Environment's (HSE) supervision. The Office of Integrated Ocean Processes (IOP) in the Red Sea Research Center (RSRC) is the latest to receive platinum certification.

The level of certification achieved (either silver, gold or platinum) depends on the percentage of benchmarks the office reaches. Each section—energy conservation, waste minimization, sustainability awareness and alternative transportation—has points assigned to it. Achieving 40% of the total allocated points earns the office a silver rating, 65% a gold and 80% a platinum rating. A "champion" appointed by each office leads the office through the process.

Angela Alfieri, a project assistant in the RSRC, was IOP's champion. She worked with Jacqueline Piper, KAUST HSE environmental and sustainability specialist, who assisted her office during the certification process.

"It wasn't hard to motivate my colleagues to take part," Alfieri said. "They are committed to protecting the environment since they are studying and researching the Red Sea."

IOP was already environmentally conscious—for example, the office doesn't use plastic glasses and silverware or paper cups, doesn't have a microwave and shuts down workstations after work. Achieving the goals in alternative transportation was easy, since most of Alfieri's colleagues use a bike or the bus to come to work. The office's only issue was minimizing energy because its location has no outside-facing windows, so overhead lighting is needed.

With combined efforts from all IOP colleagues, Alfieri's office was pleased to achieve a platinum certification level with a score of 92.39%, the highest overall score reached to date.

For more information about GOCP, visit https://facilities.kaust.edu.sa/Services/Pages/GOCP.aspx.●

Green Office Certification Program